712

PHILIPS

MANUAL

PASSIVE PROBES FOR SAMPLING
OSCILLOSCOPE PM 3400

PM 9342/01
PM 9343/01
PM 9344

9499 440 10111

720315/1/01

CONTENTS

1.	INTRODUCTION	3
1.1.	Attenuator probe PM 9342/01	3
1.2.	Attenuator probe PM 9343/01	3
1.3.	T Piece PM 9344	3
2.	TECHNICAL DATA	4
2.1.	Attenuator probe PM 9342/01	4
2.2.	Attenuator probe PM 9343/01	4
2.3.	T Piece PM 9344	5
3.	ACCESSORIES SUPPLIED WITH ATTENUATOR PROBES	6
4.	CHECKING AND ADJUSTING	7
4.1.	H.F. Response PM 9342/01	7
4.1.1.	Required measuring instruments	7
4.1.2.	Test instructions	7
4.2.	H.F. Response PM 9343/01	8
4.2.1.	Required measuring instruments	8
4.2.2.	Test instructions	8
5.	PARTS LISTS	9
5.1.	Parts for PM 9342/01	9
5.2.	Parts for PM 9343/01	9

LIST OF FIGURES

1.	Attenuator probe PM 9342/01, PM 9343/01	3
2.	T Piece PM 9344	3
3.	T Piece PM 9344 combined with probe PM 9342/01	3
4.	Pulse response PM 9342/01 with 0.5 m cable	4
5.	Pulse response PM 9342/01 with 1.0 m cable	4
6.	Pulse response PM 9343/01 with 0.5 m cable	5
7.	Pulse response PM 9343/01 with 1.0 m cable	5
8.	Test set-up for PM 9342/01	7
9.	Test set-up for PM 9343/01	8
10.	PM 9342/01, PM 9343/01 showing item numbers	9

© N.V. PHILIPS' GLOEILAMPENFABRIEKEN - EINDHOVEN - THE NETHERLANDS - 1972

1. INTRODUCTION

1.1. ATTENUATOR PROBE PM 9342/01

The PM 9342/01 is a low-capacitance, passive miniature probe with an attenuation of 10x. It is used to increase the 50 Ω input impedance of compact sampling oscilloscope PM 3400.

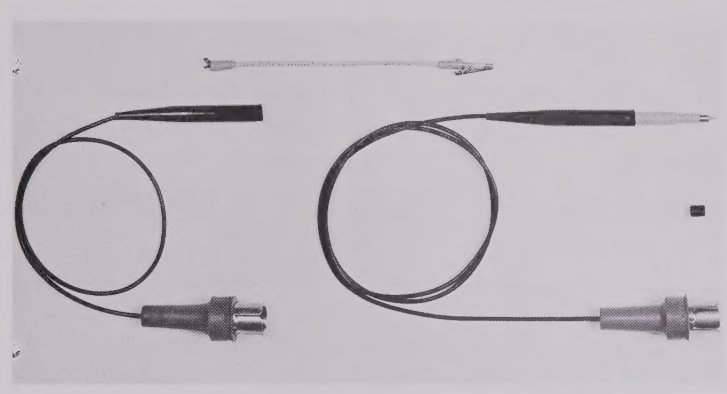

Fig. 1. Attenuator probe PM 9342/01, PM 9343/01

1.2. ATTENUATOR PROBE PM 9343/01

The PM 9343/01 is a probe similar to the PM 9342/01 but giving an attenuation of 100x.

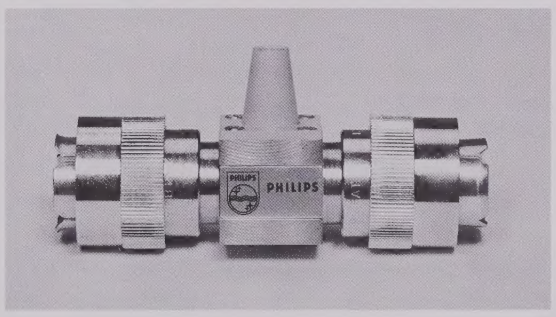

Fig. 2. T Piece PM 9344

1.3. T PIECE PM 9344

The PM 9344 is a T piece. In combination with the PM 9342/01 or PM 9343/01 probe, it allows a signal to be picked off from a closed 50 Ω system, with minimum disturbance.

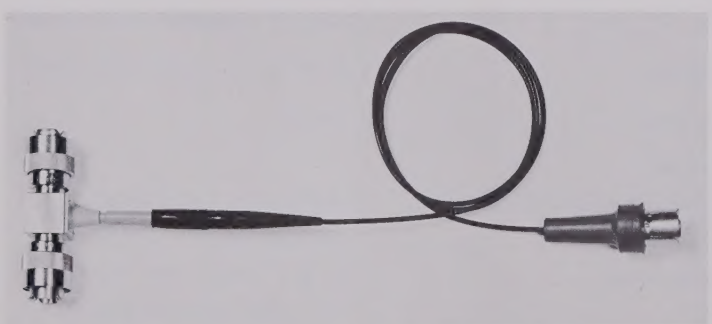

Fig. 3. T Piece PM 9344 combined with probe PM 9342/01

2. TECHNICAL DATA

2.1. ATTENUATOR PROBE PM 9342/01

Attenuation	: 10x, if connected to 50 Ω input
Input resistance	: 500 Ω (≈300 Ω at 1 GHz)
Input capacitance	: 0.7 pF
Pulse response	
rise time (10 - 90 % of applied step) t_r	: < 100 ps for 0.5 m cable < 120 ps for 1.0 m cable
response direct after t_r	for 0.5 m cable see Fig. 4 for 1.0 m cable see Fig. 5

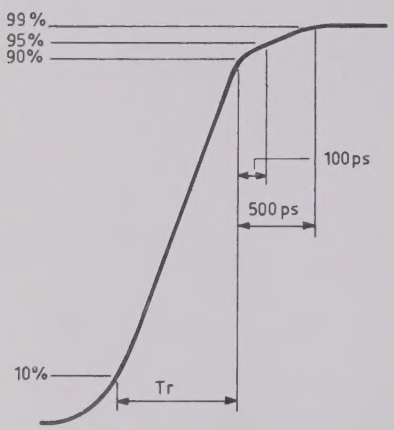

Fig. 4. Pulse response PM 9342/01 with 0.5 m cable

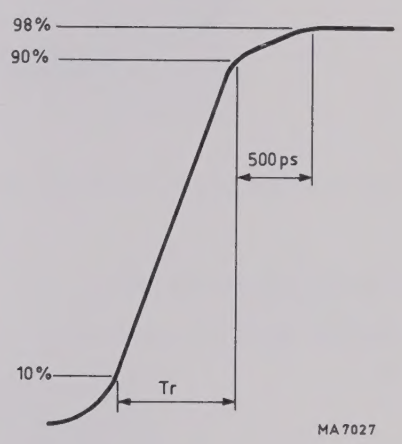

Fig. 5. Pulse response PM 9342/01 with 1.0 m cable

Equivalent bandwidth (using the formula bandwidth = $\frac{0.35}{t_r}$)	: for 0.5 m cable d.c. - 3.5 GHz for 1.0 m cable d.c. - 2.9 GHz
Max. input voltage	: d.c. 16 V a.c. 45 V_{p-p} up to 0.8 GHz

2.2. ATTENUATOR PROBE PM 9343/01

Attenuation	: 100x, if connected to 50 Ω input
Input resistance	: 5,000 Ω (≈ 1,500 Ω at 1 GHz)
Input capacitance	: 0.6 pF
Pulse response	
rise time (10 - 90 % of applied step) t_r	: < 200 ps for 0.5 m cable < 250 ps for 1.0 m cable
response direct after t_r	for 0.5 m cable see Fig. 6 for 1.0 m cable see Fig. 7

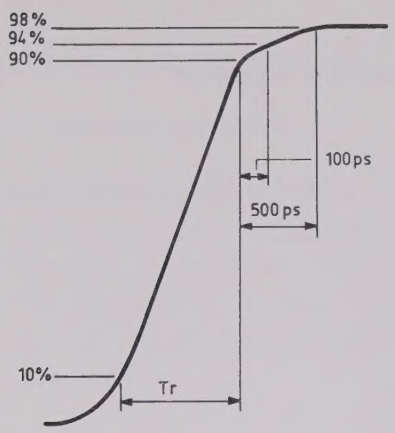

Fig. 6. Pulse response PM 9343/01 with 0.5 m cable

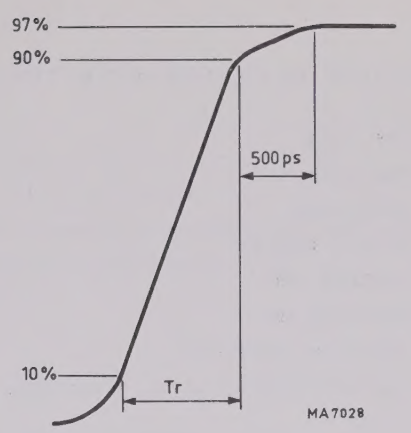

Fig. 7. Pulse response PM 9343/01 with 1.0 m cable

Equivalent bandwidth (using the formula bandwidth = $\frac{0.35}{t_r}$) : for 0.5 m cable d.c. - 1.7 GHz
for 1.0 m cable d.c. - 1.4 GHz

Max. input voltage : d.c. 50 V
a.c. 140 V_{p-p} up to 0.5 GHz

2.3. T PIECE PM 9344

Frequency range : d.c. - 2 GHz

Characteristic impedance : 50 Ω

Reflection coefficient of T piece terminated with 50 Ω:

	up to 500 MHz		up to 1 GHz		up to 2 GHz	
	ref. coef.	VSWR	ref. coef.	VSWR	ref. coef.	VSWR
without probe	≤ 0.03	1.06	≤ 0.1	1.22	≤ 0.25	1.67
with PM 9342/01	≤ 0.05	1.10	≤ 0.1	1.22	≤ 0.2	1.50
with PM 9343/01	≤ 0.03	1.06	≤ 0.03	1.06	≤ 0.05	1.10

3. ACCESSORIES SUPPLIED WITH THE ATTENUATOR PROBES

1 m	test cable
0.5 m	test cable
5	earth clips
1	B.N.C. adapter
1	earthing lead
2	insulating caps
2	miniature connectors
1	box with room for probe, accessories and T piece

4. CHECKING AND ADJUSTING

4.1. H.F. RESPONSE PM 9342/01

4.1.1. Required measuring instruments

- Square-wave generator supplying a pulse with a rise time of approximately 100 ps and an amplitude of a few hundred mV, e.g. TEKTRONIX Type 284 pulse output.
- Sampling oscilloscope PHILIPS Type PM 3400.
- T Piece PHILIPS Type PM 9344.
- 50Ω Cable.

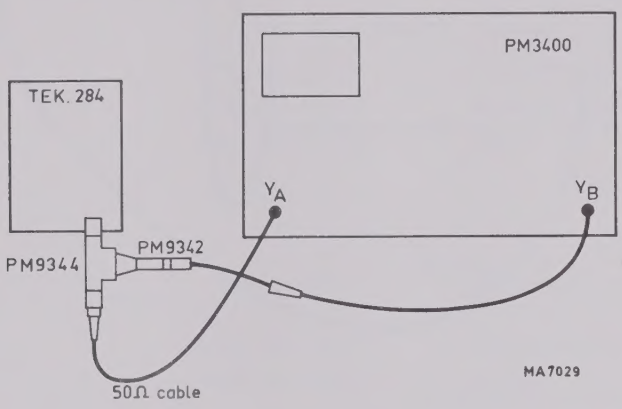

Fig. 8. Test set-up for PM 9342/01

4.1.2. Test instructions

- Set up the test arrangement shown in Fig. 8.
- Display the attenuated pulse output signal of the Pulse Generator on channel A of Sampling Oscilloscope PM 3400. This display is your reference waveform.
- Display the signal via the probe on channel B of the oscilloscope.
- To display the traces of both channels close together, the length of the coaxial cable should equal the length of the probe cable.
- Check that the display of channel B has approximately the same waveform as that of channel A. If necessary, readjust the probe.
  Remove, to this end, the sleeve of the probe, slacken the locking nut and rotate the foremost section of the probe in relation to the rearmost section to obtain an optimum waveform. Tighten the locking nut without disturbing the adjustment and refit the sleeve.

4.2. H.F. RESPONSE PM 9343/01

4.2.1. Required measuring instruments

- Sampling oscilloscope PHILIPS Type PM 3400.
- T Piece PM 9344.
- 50Ω Cable.

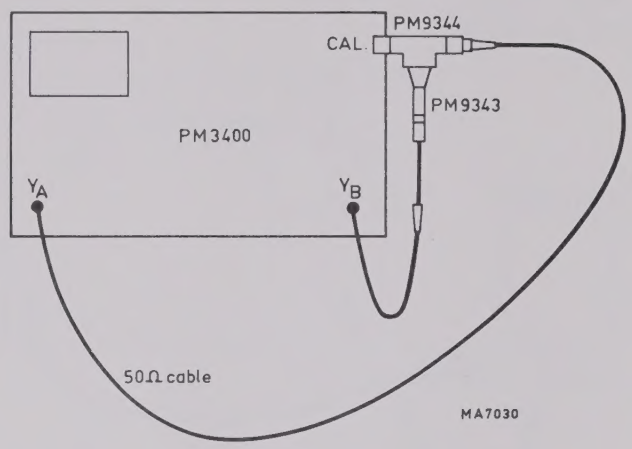

Fig. 9. Test set-up for PM 9343/01

4.2.2. Test instructions

- Set up the test arrangement shown in Fig. 9.
- Display the unattenuated output signal of the CAL. socket via the A channel of the Sampling Oscilloscope. This display is your reference waveform.
- Display the same signal via the probe on the B channel of the oscilloscope.
- To display the traces of both channels close together, the length of the coaxial cable should equal the length of the probe cable.
- Check that the display of channel B has approximately the same waveform as that of channel A. If necessary, readjust the probe.
  Remove, to this end, the sleeve of the probe, slacken the locking nut and rotate the foremost section of the probe in relation to its rearmost section to obtain an optimum waveform.
  Tighten the locking nut without disturbing the adjustment and refit the sleeve.

5. PARTS LIST

5.1. PARTS FOR PM 9342/01

Item	Fig.	Qty.	Order number	Description
1	10	1	5322 447 64003	Attenuator tip
2	10	2	5322 325 54015	Sleeve
3	10	-	5322 320 10037	50Ω Cable (per metre)
4	10	2	5322 264 10031	50Ω Connector
5	10	1	5322 321 20133	Earthing cable
6	-	1	5322 263 50022	Adaptor
7	-	6	5322 492 60938	Earthing clip
8	-	2	5322 267 10043	Miniature connector
9	10	2	5322 462 70726	Cap

5.2. PARTS FOR PM 9343/01

Item	Fig.	Qty.	Order number	Description
1	10	1	5322 447 64004	Attenuator tip
2	10	2	5322 325 54016	Sleeve

The other items are identical to items 3 to 9 of the PM 9342/01 probe.

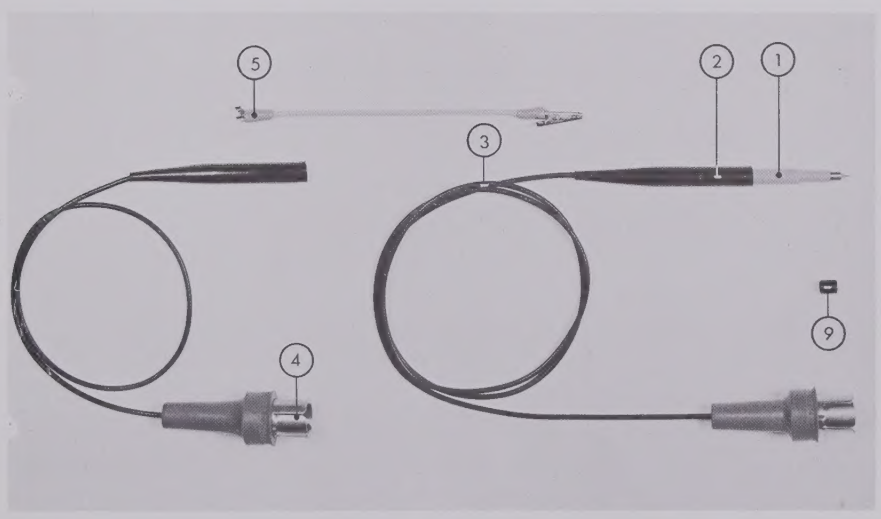

Fig. 10. PM 9342/01, PM 9343/01 showing item numbers